

***Interactive comment on “Scale-by-scale analysis of probability distributions for global MODIS-AQUA cloud properties: how the large scale signature of turbulence may impact statistical analyses of clouds” by M. de la Torre Juárez et al.***

**Anonymous Referee #1**

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This paper investigates properties of clouds averaged at different scales. Although the topic is interesting, some extra explanations are necessary in order to clarify what the authors are exactly doing.

My main problem is with Sec. 3 and beyond. It is stated that 1st the local mean is subtracted to the variable, and then the global average of this quantity is calculated. But if I have understood right, this average should be zero. Each pixel of size  $L$  has

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a contribution to the global mean equal to zero, and therefore this quantity should be zero. It is possible that I am not understanding what the authors are doing, and then this means that the explanation is not clear enough. Please explain in more detail, including some mathematical formulas.

Other comments:

Abstract: "... compared to predictions for turbulent". This statement is too vague. In the paper only a lognormal function is fit.

Figure 2 is not clear also.  $L=5$  km should correspond to the "original" data, but the PDF of CF takes a non-zero value at  $CF=0.5$ , whereas CF should only take the values 1 and 0. Also, for  $L=10$  km,  $CF=0.65$  has a nonzero pdf, whereas the possible values would be 0, 0.25, 0.5, 0.75 and 1. Please clarify. Perhaps a logarithmic y-axis would be better to see this.

Check what happens in Fig. 2b if both axis are logarithmic. Do the distributions share a similar shape?

In the equation for  $Y_{LWP}(1)$  a symbol "<" is missing.

Which are the units in table 1?

Fig. 1 caption. It corresponds to the W and NW of the Canary Island (correct).

Which is the color scale for CER and LWP in Fig. 1?

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